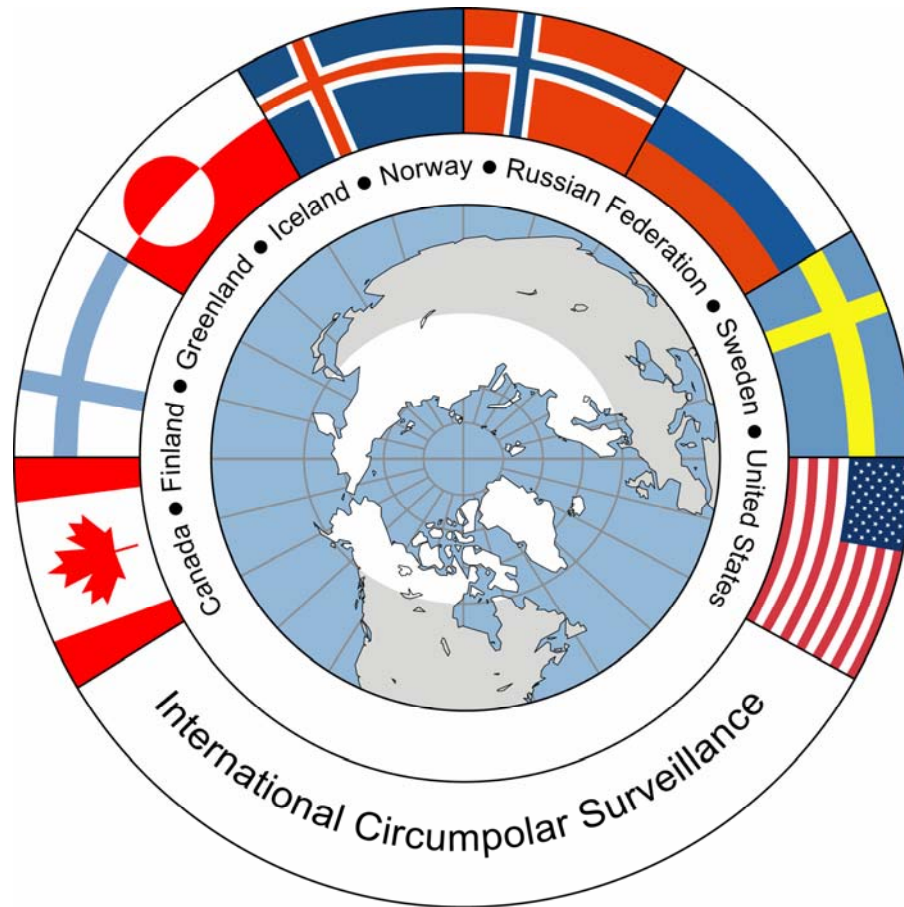


# INTERNATIONAL CIRCUMPOLAR SURVEILLANCE (ICS) SUMMARY REPORT



**YEAR 2003 DATA**



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## SUMMARY

International Circumpolar Surveillance (ICS), a population-based surveillance system for invasive bacterial diseases, has been established in the U.S. Arctic, Northern Canada, Greenland, Iceland, Norway, Finland, and Northern Sweden. Data collection began in 1999 and includes the organisms *Streptococcus pneumoniae* (Sp), *Haemophilus influenzae* (Hi), *Neisseria meningitidis* (Nm), and groups A and B *Streptococcus* (GAS, GBS). This report reviews the data collected for the year 2003.

Data on invasive disease with the organism *Streptococcus pneumoniae* are collected from all participating countries; data on invasive disease due to the remaining organisms are currently collected by the U.S. Arctic, Northern Canada, Greenland, and, beginning with this reporting year, N. Sweden. A total of 1,940 cases of invasive pneumococcal disease were identified in 2003. Overall, rates of invasive *S. pneumoniae* were highest in individuals less than 2 years of age, however, the median age of cases was greater than 35 years in all countries. Case fatality ratios ranged from 0-20%. Race and ethnicity data are collected only in N. Canada and the U.S. Arctic; rates of invasive pneumococcal disease in Northern Canadian Aboriginals and U.S. Arctic Native populations were 24 and 46 cases per 100,000 population, respectively, which represents a decrease in disease from 2002 in Northern Canadian Aboriginals and an increase in disease in U.S. Arctic Natives. Pneumonia and septicemia were the most common clinical presentations; cigarette smoking was the most common risk factor. Pneumococcal vaccine status was reported from three countries: Canada, Norway, and the U.S. Arctic and ranged from 0-93% of reported cases vaccinated. The most common *S. pneumoniae* serotype in Finland and Iceland is 14; in the U.S. Arctic the most common serotype is 19A; in Norway the most common serotype is 3; and in Greenland and N. Canada the most common serotype is 1.

Data on invasive disease due to *Haemophilus influenzae*, *Neisseria meningitidis*, and groups A and B *Streptococcus* are currently collected in Greenland, Northern Canada, Northern Sweden and the U.S. Arctic. A total of 26 *H. influenzae* cases, 9 *N. meningitidis* cases, 31 group A *Streptococcus* cases, and 29 group B *Streptococcus* cases were reported in 2003. In general, the highest rates of disease as a result of all organisms occurred in N. Canada Aboriginal or Alaska Native persons less than two years of age.

### Surveillance Organisms Reported by Country, ICS 2003 Data

Country	<i>S. pneumoniae</i> n (rate*)	<i>H. influenzae</i> n (rate*)	<i>N. meningitidis</i> n (rate*)	group A <i>Strep</i> n (rate*)	group B <i>Strep</i> n (rate*)
Finland	718 (13.8)	N/A	N/A	N/A	N/A
Greenland	12 (21.2)	0 (0)	3 (5.3)	0 (0)	0 (0)
Iceland	41 (14.2)	N/A	N/A	N/A	N/A
N. Canada	30 (23.5)	6 (4.7)	1 (0.8)	7 (5.5)	4 (3.1)
N. Sweden	27 (10.7)	1 (0.4)	1 (0.4)	1 (0.4)	5 (2.0)
Norway	1014 (22.3)	N/A	N/A	N/A	N/A
U.S. Arctic	98 (15.1)	19 (2.9)	4 (0.6)	23 (3.5)	20 (3.1)
Total	1940 (17.4)	26 (2.4)	9 (0.9)	31 (2.9)	29 (2.7)

\*Cases per 100,000

## INTRODUCTION

In January, 1999, the United States and Canada began international cooperative population-based surveillance for invasive *Streptococcus pneumoniae* by all laboratories serving residents of the North American Arctic. In January, 2000, this surveillance system expanded to include invasive diseases with the following organisms: *Haemophilus influenzae* (all types), *Neisseria meningitidis*, group A *Streptococcus*, and group B *Streptococcus*. These pathogens were selected for ICS because rates of these diseases are elevated in indigenous peoples of the north, strains demonstrate resistance to commonly used antibiotics, they are routinely cultured in clinical laboratories, and clinically important serotypes of *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Neisseria meningitidis* are vaccine preventable in infants and adults.

Denmark's autonomous region of Greenland joined ICS in 2000; Iceland, Norway (including Svalbard), and Finland joined in 2001; and Northern Sweden joined in 2003. To date, year 2003 data has been submitted by Finland, Greenland, Iceland, Northern Canada, Northern Sweden, Norway, and the U.S. Arctic (Alaska). This report contains year 2003 data on all five surveillance organisms from Greenland, Northern Canada, Northern Sweden, and the U.S. Arctic, and *Streptococcus pneumoniae* data from Finland, Iceland, and Norway.

## GOALS

The goal of ICS is to establish an integrated network of hospital and public health facilities throughout the Arctic countries to monitor infectious diseases of concern. Linking public health facilities within Arctic nations will allow for the collection and sharing of uniform laboratory and epidemiological data that will describe the prevalence of infectious diseases in Arctic populations and assist in the formulation of prevention and control strategies.

The project, initiated in 1998, focused on establishing an ICS system for diseases caused by *Streptococcus pneumoniae*. This bacterium causes pneumonia, meningitis, and bacteremia in both the very young and the elderly. Once easily treated with antibiotics, this bacterium is now becoming resistant to commonly used antibiotics. This is of great concern to the public health community and is increasingly a target for surveillance by many countries worldwide. A polysaccharide vaccine is available for use in persons two years of age and older. In the U.S. Arctic, this vaccine is recommended for all those 55 years of age and older. A conjugate vaccine for infants has been developed and is licensed for use in the U.S., Canada, and the European Union. The fact that diseases caused by *Streptococcus pneumoniae* are already being monitored by many public health authorities within the Arctic states makes establishing a circumpolar surveillance system for this infection feasible. In addition, due to the availability of polysaccharide and conjugate vaccines, much of the morbidity and mortality caused by *Streptococcus pneumoniae* is currently preventable.

ICS objectives include:

- Identify key public health contacts within Arctic countries. These persons should be familiar with infectious disease surveillance systems in place (particularly surveillance systems for diseases caused by *Streptococcus pneumoniae*) in the member country. Through correspondence and working group meetings, the scope and gaps of the surveillance systems are determined.
- Determine the comparability of laboratory and data collection methods, and negotiate standard protocols and quality control programs.

- Share and report data in agreed upon formats.
- Form a working group of key laboratory and public health contacts to coordinate pneumococcal surveillance within their respective jurisdictions. This group meets on a regular basis to review problems, progress, compliance, report generation, and future plans.
- Form a steering committee of national Arctic health experts to coordinate new objectives and initiatives within ICS.

This program forms a framework through which surveillance of other infectious diseases as well as prevention and control programs can be added. Other infectious diseases of circumpolar community concern include: other invasive bacterial diseases (caused by *Haemophilus influenzae*, *Neisseria meningitidis*, groups A and B *Streptococcus*), tuberculosis, HIV, hepatitis, foodborne diseases (botulism, brucellosis), waterborne diseases, respiratory diseases of children such as those caused by respiratory syncytial virus, and chronic conditions related to infectious agents (hepatitis B virus and liver cancer, human papilloma virus and cervical cancer). In addition, the surveillance model developed by this program for infectious disease may be adapted to monitor other non-infectious human health priorities of community concern.

## METHODS

ICS is coordinated by personnel at the Arctic Investigations Program, Centers for Disease Control and Prevention, in Anchorage, Alaska.

A case of invasive *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, or groups A and B *Streptococcus* is defined as an isolate of the bacteria from a normally sterile site, including blood, cerebrospinal fluid, pleural fluid, peritoneal fluid or joint fluid that has been taken from a resident of the surveillance area.

In the U.S. Arctic and Northern Canada, laboratory, demographic and clinical data are collected continually by ICS, while in Greenland, Iceland, Northern Sweden, Norway, and Finland, summary data are submitted to ICS in aggregate at the end of the year.

### Quality Control

Currently 37 clinical laboratories in the U.S. Arctic and N. Canada forward isolates from patients with invasive pneumococcal disease to reference laboratories in Alaska and Canada respectively. To ensure inter-laboratory comparability of *Streptococcus pneumoniae* serotyping and antimicrobial susceptibility testing between two reference laboratories in Canada (Alberta and Quebec) and one in the U.S. (Alaska), the ICS *Streptococcus pneumoniae* inter-laboratory quality control (QC) program was established in 1999.

Each reference laboratory is responsible for exporting one QC panel of seven *Streptococcus pneumoniae* isolates each year to each of the other laboratories using a transportation medium of their choice for a total of 21 *Strep pneumoniae* isolates per year. Serotyping was performed by Quellung reaction. Minimum inhibitory concentration (MIC) is determined for each QC isolate and for ATCC strain 49619 for those antibiotics which are routinely tested in each laboratory. MIC results for each laboratory are expected to be within one log<sub>2</sub> dilution of each other regardless of

testing method. Discrepancies of results are documented and examined to determine causes and solutions.

### Finland

- 23 district hospital laboratories participate in ICS.
  - Provide diagnostic microbiology services for all residents of Finland.
  - All invasive isolates of Sp submitted to the National Public Health Institute (KTL) laboratory in Oulu.
- Antimicrobial susceptibility testing of Sp isolates was performed by agar dilution method at district hospital laboratories as well as the KTL laboratory.
- Serotyping is performed at the KTL laboratory by counter-immune-electrophoresis.
- Population estimates for 2003 were obtained from the website <http://www.stat.fi>

### Greenland

- 15 district hospital laboratories participate in ICS.
  - Provide diagnostic microbiology services for all residents of Greenland.
  - All invasive isolates of Sp, Hi, Nm, GAS, and GBS submitted to reference laboratories in Nuuk and Copenhagen.
- Antimicrobial susceptibility testing of Sp isolates was performed by agar dilution at the central laboratory at Queen Ingrid's Hospital in Nuuk.
- Serotyping was performed at the Statens Serum Institute in Copenhagen, Denmark, by the Quellung method.
- Clinical and demographic data for every case of invasive Sp, Hi, Nm, GAS, and GBS was collected by public health authorities at the end of the year and entered onto a standardized collection tool, the Bacterial Diseases Surveillance Form (BDSF), which is also used in Iceland, Northern Canada, and the U.S. Arctic.
- Population estimates for 2003 were obtained from the website <http://www.statgreen.gl>

### Iceland

- 10 district hospital laboratories and one regional laboratory participate in ICS.
  - Provide diagnostic microbiology services for all residents of Iceland.
  - All invasive isolates of Sp submitted to the reference hospital in Reykjavik.
- Antimicrobial susceptibility testing of Sp isolates is performed by disc diffusion method at the Landspítali University Hospital (LUH) in Reykjavik and the laboratory at the regional hospital in Akureyri. All oxacillin resistant isolates are then analyzed by E test.

- Serotyping is performed at the LUH by coagglutination using antisera from Statens Serum Institute.
- Clinical and demographic data for every case of invasive Sp was collected by public health authorities at the end of the year and entered onto the same collection form (BDSF) used in Greenland, Northern Canada, and the U.S. Arctic.
- Population estimates for 2003 were obtained from the website <http://www.hagstofa.is>

#### Northern Canada

- 14 Canadian laboratories participate in ICS.
  - Provide diagnostic microbiology services for all residents of the Yukon Territory, Northwest Territories, Nunavut, Northern Quebec, and Northern Labrador.
  - Submit all invasive isolates of Sp, Hi, Nm, GAS, and GBS to one of two reference laboratories in Canada.
  - Sp, Hi, GAS, and GBS isolates are serotyped by the Quellung method using Statens Serum Institute antisera.
- Antimicrobial susceptibility of Sp, GAS, and GBS isolates was tested by micro-broth dilution (according to NCCLS recommendations).
- Communicable disease consultants located within one of the five regions of Northern Canada provided clinical and demographic information on the same collection form (BDSF) used in Greenland, Iceland, and the U.S. Arctic.
- Laboratory and clinical data are forwarded to the ICS coordinator at AIP in Anchorage.
- Population estimates for 2003 were obtained from the website <http://www.statcan.ca>

#### Northern Sweden

- 1 district laboratory participates in ICS.
  - Provides diagnostic microbiology services for all residents of Norrbotten County
  - The main reference laboratory is at the Swedish Institute for Infectious Disease Control in Stockholm.
  - Isolates are serotyped by the Quellung method.
- Antimicrobial susceptibility testing was by disc diffusion at the University Hospital in Umea and Sunderby Hospital in Lulea.
- Population estimates for 2003 were obtained from the website [http://www.scb.se/default\\_2154.asp](http://www.scb.se/default_2154.asp)

#### Norway

- 33 district hospital laboratories participate in ICS.
  - Provide diagnostic microbiology services for all residents of Norway.

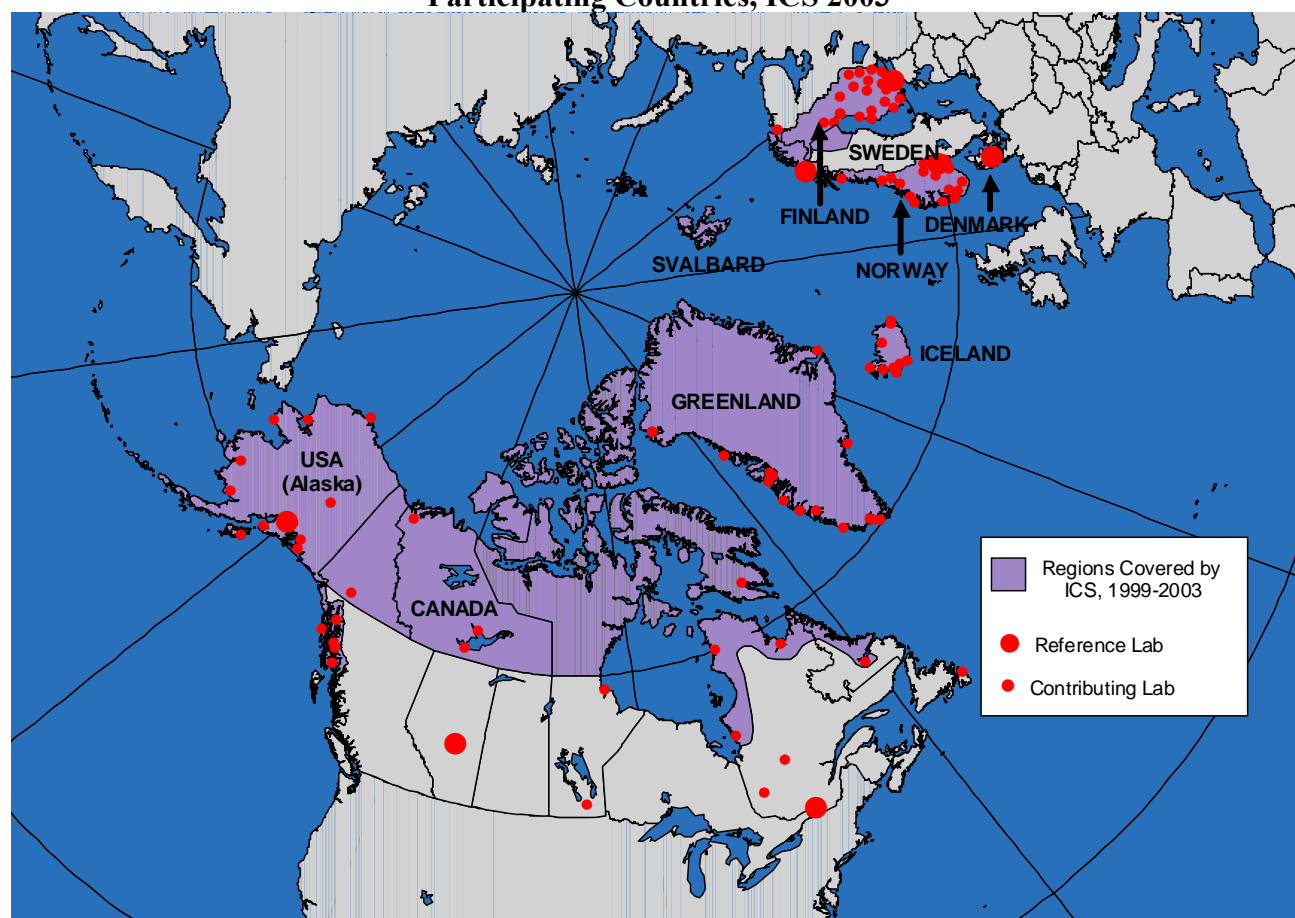


- All invasive isolates of Sp submitted to one of two reference laboratories in Oslo or Tromsø.
- Antimicrobial susceptibility testing of Sp isolates is performed using the disc diffusion method at district hospital laboratories, the reference laboratory in Tromsø or the main national laboratory in Oslo.
- Serotyping is performed at the Statens Serum Institute in Denmark by the Quellung method.
- Population estimates for 2003 were obtained from the website <http://www.ssb.no>

### U.S. Arctic

- Population-based surveillance in the state of Alaska
  - Since 1980 for invasive Hi.
  - Since 1986 for invasive Sp.
  - Since 1999 for invasive diseases caused by Nm, GAS, and GBS.
  - Coordinated by the Arctic Investigations Program (AIP), National Center for Infectious Disease, Centers for Disease Control and Prevention, in Anchorage, Alaska.
- 23 laboratories providing diagnostic services to residents of Alaska submitted to AIP isolates of Sp, Hi, Nm, GAS, and GBS cultured in blood, cerebrospinal fluid, or from other sterile sites.
  - Sp and Hi isolates are serotyped by the Quellung method using Statens Serum Institute antisera.
  - Serogroup testing of Nm isolates from Alaska is performed at the Canadian National Centre for Meningococcal Disease in the CNS Infections Laboratory in Winnipeg.
    - ◆ By the slide agglutination method using specific antisera.
    - ◆ By PCR detection of the *siaD* gene responsible for synthesis of the serogroup-specific polysialyltransferase.
- Antimicrobial susceptibility testing of Sp isolates is performed at AIP by micro-broth dilution (according to NCCLS recommendations).
- Clinical and demographic information on each case-patient is recorded by AIP research nurses onto the same collection form (BDSF) used in Greenland, Iceland, and Northern Canada.
- Population estimates for 2003 were obtained from the website <http://www.labor.state.ak.us>

## Participating Countries, ICS 2003



## RESULTS

### *Streptococcus pneumoniae*

#### Case Demographics

A total of 1,940 cases of invasive disease caused by *Streptococcus pneumoniae* were reported to ICS during 2003 by Finland, Greenland, Iceland, N. Canada, N. Sweden, Norway, and the U.S. Arctic. The highest rates of disease (24 per 100,000) occurred in N. Canada and the lowest in N. Sweden (11 per 100,000) with an overall rate for the ICS circumpolar region of 17 per 100,000; 52% of all cases occurred in males. The median age of cases overall was 58 years with the lowest median age in Greenland (40 years) and the highest in Norway and N. Sweden (63 years). Case fatality ratios ranged from 0% in N. Canada and N. Sweden to 20% in Greenland; the overall case fatality ratio was 8%.

#### *Streptococcus pneumoniae* Case Demographics, ICS 2003 Data

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
Finland	5,219,732	718	13.8	398 (55)	55.5 (0-98)	‡
Greenland	56,676	12	21.2	5 (42)	39.5 (0.4-63.9)	2 (20) <sup>a</sup>
Iceland	288,471	41	14.2	17 (41)	61.5 (0.5-95.6)	5 (14)
N. Canada	127,913	30	23.5	18 (60)	46.9 (0.5-77.3)	0 (0) <sup>a</sup>
N. Sweden	252,874	27	10.7	14 (52)	63.2 (0.8-89.4)	0 (0)
Norway	4,552,252	1,014	22.3	502 (49)	63.2 (0-98.8)	79 (8) <sup>a</sup>
U.S. Arctic	648,818	98	15.1	56 (57)	48.3 (0.3-88.4)	10 (10)
<b>Total</b>	<b>11,198,546</b>	<b>1,940</b>	<b>17.3</b>	<b>1,010 (52)</b>	<b>58.7 (0-98.8)</b>	<b>96 (8)</b>

\*Number of cases per 100,000 per year

†Case fatality ratio

‡Case outcomes not reported from Finland

<sup>a</sup>Case outcomes unknown in cases from Greenland (2) N. Canada (4), Norway (2)

#### *Streptococcus pneumoniae* by Age Category, ICS 2003 Data

Age	Finland	Greenland	Iceland	N. Canada	N. Sweden	Norway	U.S. Arctic
<2 yrs	Pop	112,091	1,793	8,241	4,744	4,665	112,914
	N (%)	60 (8)	2 (17)	5 (12)	5 (17)	1 (4)	63 (6)
	Rate*	54	112	61	105	21	72
2-19 yrs	Pop	1,127,760	17,136	78,390	43,888	54,372	1,069,494
	N (%)	70 (10)	2 (17)	5 (12)	6 (20)	0 (0)	63 (6)
	Rate*	6	12	6	14	0	5
20-64 yrs	Pop	3,166,686	34,693	168,049	73,875	146,711	2,696,268
	N (%)	368 (51)	8 (66)	11 (27)	12 (40)	13 (48)	403 (40)
	Rate*	12	23	7	16	9	15
65+ yrs	Pop	813,195	3,054	33,791	5,406	47,126	673,576
	N (%)	220 (31)	0 (0)	20 (49)	6 (20)	13 (48)	485 (48)
	Rate*	27	0	59	111	28	72
All ages	Pop	5,222,715	56,676	288,471	127,913	252,874	4,601,079
	N	718	12	41	30	27	1,014
	Rate*	14	21	14	24	11	22

\*Number of cases per 100,000 per year

When stratified by age, the highest rates of disease in each age category were in Greenland and N. Canada; however, the total number of cases reported in Greenland was small and therefore rates are unstable and should be regarded only as an indication of relative differences. The lowest rates were in N. Sweden. The highest rates of disease in all countries occurred in those cases less than two years of age and in cases 65+ years of age, with the exception of Greenland, where no cases were reported in individuals 65+ years of age.

### Seasonality

*Streptococcus pneumoniae* was diagnosed in each country throughout the year in 2003. With the exception of Greenland, N. Sweden and the U.S. Arctic, the highest proportion of *S. pneumoniae* cases were diagnosed during the fourth quarter (October, November, December) of the calendar year. The Greenland and N. Sweden data showed no distinct seasonality although the number of cases reported in each country was small. In the U.S. Arctic, cases were reported evenly across all four quarters of the year.

### Race

Race and ethnicity data was collected in N. Canada and the U.S. Arctic. Rates of invasive pneumococcal disease were higher in Aboriginal and Native populations than in non-Aboriginal and non-Native populations with the exception of non-Aboriginals 65+ years in N. Canada. High rates of disease occurred in Aboriginal and Native populations less than 2 years of age in both countries.

#### ***Streptococcus pneumoniae* by Race and Age Categories, ICS 2003 Data**

Streptococcus pneumoniae by Race and Age Categories, ICS 2005 Data					
Age (yrs)		N. Canada*		U.S. Arctic†	
		Aboriginal	Non-Aboriginal	Native	Non-Native
<2	Population	3,598	1,146	5,687	15,163
	Cases (rate‡)	4 (111)	0 (0)	11 (193)	4 (26)
2-19	Population	31,848	12,040	47,642	148,931
	Cases (rate‡)	3 (9)	1 (8)	3 (6)	5 (3)
20-64	Population	37,387	36,488	63,789	330,567
	Cases (rate‡)	10 (26)	0 (0)	37 (58)	20 (6)
65+	Population	3,037	2,369	7,004	32,020
	Cases (rate‡)	1 (33)	4 (169)	6 (86)	9 (28)
All	Population	75,870	52,043	124,122	524,696
Ages	Cases (rate‡)	18 (24)	5 (10)	57 (46)	38 (7)

\*Race unknown in 1 case <2 years, 2 cases 2-19 years, 2 cases 20-64 years, 1 case 65+ years

†Race unknown in 2 cases 2-19 years, 1 case 65+ years

‡Number of cases per 100,000 per year

### Clinical Presentation

The most common clinical presentations associated with *Streptococcus pneumoniae* were pneumonia, bacteremia or septicemia, and meningitis. Clinical diagnoses other than bacteremia and meningitis are not reported in the Finland and N. Sweden *S. pneumoniae* data. In Greenland, the clinical presentation reported most often was pneumonia (33%) or meningitis (33%); in Iceland and N. Sweden it was bacteremia (93% and 78%, respectively); and in N. Canada, Norway, and the U.S. Arctic, it was pneumonia (53%, 39% and 66% respectively).

### Clinical Presentation of Reported *Streptococcus pneumoniae* Cases, ICS 2003 Data

	Finland n (%)	Greenland n (%)	Iceland n (%)	N Canada n (%)	N Sweden n (%)	Norway n (%)	US Arctic n (%)
<b>Pneumonia*</b>	0 (0)	4 (33)	0 (0)	16 (53)	0 (0)	393 (39)	65 (66)
<b>Septicemia</b>	0 (0)	1 (8)	0 (0)	8 (27)	0 (0)	310 (31)	15 (15)
<b>Bacteremia</b>	680 (95)	0 (0)	38 (93)	1 (3)	21 (78)	176 (17)	0 (0)
<b>Meningitis</b>	38 (5)	4 (33)	2 (5)	2 (7)	6 (22)	72 (7)	5 (5)
<b>Empyema</b>	0 (0)	0 (0)	0 (0)	2 (7)	0 (0)	0 (0)	6 (6)
<b>Cellulitis*</b>	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)
<b>Septic arthritis</b>	0 (0)	1 (8)	1 (2)	0 (0)	0 (0)	2 (<1)	1 (1)
<b>Endocarditis</b>	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
<b>Pericarditis</b>	0 (0)	1 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
<b>Peritonitis</b>	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)	2 (2)
<b>Epiglottitis</b>	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (<1)	0 (0)
<b>Osteomyelitis</b>	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
<b>Other</b>	0 (0)	1 (8)	0 (0)	0 (0)	0 (0)	52 (5)	0 (0)
<b>Unknown</b>	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8 (<1)	0 (0)
<b>Total Cases</b>	718	12	41	30	27	1,014	98

\*with bacteremia

### Risk Factors

N. Canada and the U.S. Arctic report medical conditions or risk factors associated with *Streptococcus pneumoniae*; in adults 18 years and older, the most frequently reported conditions or factors were cigarette smoking, chronic lung disease and alcohol abuse. In N. Canada, the most common risk factor was chronic lung disease which was reported in 37% of adult cases. In the U.S. Arctic, alcohol abuse was the most commonly reported risk factor in 49% of adult cases.

### *Streptococcus pneumoniae* Risk Factor/Medical Conditions in Adults\*, ICS 2003 Data

	N. Canada n (%)	U.S. Arctic n (%)
<b>Cigarette Smoking</b>	6 (32)	35 (48)
<b>Chronic Lung Disease and/or Asthma</b>	7 (37)	25 (34)
<b>Alcohol Abuse</b>	6 (32)	36 (49)
<b>Immunosuppressive Therapy</b>	2 (11)	4 (5)
<b>Diabetes</b>	6 (32)	12 (16)
<b>Asplenia</b>	0 (0)	2 (3)
<b>Total Adult* Cases</b>	19	73

\*≥ 18 years

### Vaccination Status

In Finland, Iceland, N. Canada, Norway, and the U.S. Arctic, 23-valent pneumococcal polysaccharide vaccine (PS23) is recommended for persons 55 years and older (U.S. Arctic), over 60 years (Iceland) or over 65 years of age (Finland, N. Canada, Norway), and to persons greater than two years of age (Finland, Iceland, Norway, U.S. Arctic) or greater than five years of age (N. Canada) with specific medical problems. The vaccine is only recommended for certain risk groups in N. Sweden. The pneumococcal 7-valent conjugate vaccine (PCV7) was introduced into the infant

immunization schedule in the U.S. Arctic in January, 2001. Vaccine data was not reported from Finland and Iceland. Seventy-five and ninety-three percent of *Streptococcus pneumoniae* cases in children less than 2 years of age with known vaccination status were vaccinated with PCV7 in N. Canada and the U.S. Arctic, respectively. No *Streptococcus pneumoniae* cases with known vaccination status in Norway were vaccinated with PCV7 indicating much less frequent use of this vaccine. A similar pattern in Norway of vaccine use in adults eligible for PS23 vaccine is apparent. In N. Canada and the U.S. Arctic, higher percentages of adults eligible for PS23 vaccine are vaccinated.

***Streptococcus pneumoniae* Case Vaccination Status for Pneumococcal Vaccine, ICS 2003 Data**

	N. Canada	Norway	U.S. Arctic
<b>Total cases eligible for PCV7 vaccine*</b>	5	63	15
<b>Vaccine status known in cases eligible for PCV7</b>	4	41	15
<b>Cases eligible for PCV7 vaccinated (%)†</b>	3 (75)	0 (0)	14 (93)
<b>Total cases eligible for PS23 vaccine‡</b>	6	485	32
<b>Vaccine status known in cases eligible for PS23</b>	5	187	14
<b>Cases eligible for PS23 vaccinated (%)†</b>	3 (60)	4 (2)	10 (71)

\*Children less than 2 years of age

†Percent of vaccine status known cases

‡Adults 55 years and older in the U.S. Arctic, 65 years and older in N. Canada and Norway

Serotypes

The most prevalent *Streptococcus pneumoniae* serotypes reported by ICS countries in 2003 were 1, 3, 12F and 14, all of which are included in the 23-valent pneumococcal polysaccharide vaccine; serotype 14 is also included in the 7-valent conjugate vaccine. Serogroups only were reported by Norway. In the following table, yellow highlights the most common serotypes in each country.

***Streptococcus pneumoniae* Serotypes by Country, ICS 2003 Data**

Serotype	Finland n (%)	Greenland n (%)	Iceland n (%)	N. Canada n (%)	Norway n (%)	U.S. Arctic n (%)
<b>1</b>	9 (1)	4 (40)	1 (2)	6 (21)	49 (5)	0 (0)
<b>2</b>	0 (0)	0 (0)	0 (0)	0 (0)	102 (10)	0 (0)
<b>3</b>	61 (8)	0 (0)	3 (7)	1 (3)	116 (11)	8 (9)
<b>4</b>	79 (11)	1 (10)	2 (5)	1 (3)	51 (5)	6 (7)
<b>5</b>	0 (0)	0 (0)	0 (0)	0 (0)	33 (3)	0 (0)
<b>6</b>	0 (0)	0 (0)	0 (0)	0 (0)	55 (5)	0 (0)
<b>6A</b>	21 (3)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)
<b>6B</b>	47 (6)	0 (0)	2 (5)	2 (7)	0 (0)	1 (1)
<b>7</b>	0 (0)	0 (0)	6 (15)	0 (0)	78 (8)	0 (0)
<b>7C</b>	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
<b>7F</b>	61 (8)	0 (0)	0 (0)	1 (3)	0 (0)	2 (2)
<b>8</b>	13 (2)	0 (0)	1 (2)	2 (7)	25 (2)	8 (9)
<b>9</b>	0 (0)	0 (0)	3 (7)	0 (0)	42 (4)	0 (0)
<b>9N</b>	21 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
<b>9V</b>	63 (8)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
<b>10</b>	10 (1)	0 (0)	0 (0)	0 (0)	33 (3)	0 (0)

Serotype	Finland n (%)	Greenland n (%)	Iceland n (%)	N. Canada n (%)	Norway n (%)	U.S. Arctic n (%)
10A	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	3 (3)
11	0 (0)	0 (0)	0 (0)	0 (0)	74 (7)	0 (0)
11A	10 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
12	0 (0)	0 (0)	0 (0)	0 (0)	39 (4)	0 (0)
12F	22 (3)	2 (20)	0 (0)	1 (3)	0 (0)	11 (12)
13	2 (<1)	0 (0)	0 (0)	0 (0)	59 (6)	1 (1)
14	101 (14)	1 (10)	8 (20)	1 (3)	25 (2)	2 (2)
15	0 (0)	0 (0)	0 (0)	0 (0)	50 (5)	0 (0)
15A	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
15B	4 (<1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
15C	4 (<1)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)
15F	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
16	7 (<1)	0 (0)	0 (0)	1 (3)	63 (6)	0 (0)
16F	0 (0)	1 (10)	0 (0)	2 (7)	0 (0)	4 (4)
17	3 (<1)	0 (0)	0 (0)	0 (0)	30 (3)	0 (0)
17F	0 (0)	1 (10)	0 (0)	0 (0)	0 (0)	1 (1)
18	0 (0)	0 (0)	0 (0)	0 (0)	37 (4)	0 (0)
18C	33 (4)	0 (0)	0 (0)	2 (7)	0 (0)	3 (3)
19	0 (0)	0 (0)	0 (0)	0 (0)	36 (4)	0 (0)
19A	39 (5)	0 (0)	0 (0)	1 (3)	0 (0)	15 (16)
19F	27 (4)	0 (0)	0 (0)	0 (0)	0 (0)	3 (3)
20	2 (<1)	0 (0)	0 (0)	1 (3)	17 (2)	1 (1)
21	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)
22	0 (0)	0 (0)	4 (10)	1 (3)	0 (0)	0 (0)
22F	29 (4)	0 (0)	0 (0)	2 (7)	0 (0)	3 (3)
23	0 (0)	0 (0)	5 (12)	0 (0)	0 (0)	0 (0)
23A	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
23F	50 (7)	0 (0)	0 (0)	1 (3)	0 (0)	1 (1)
31	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
33	9 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
33F	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
34	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
35B	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)
35F	5 (<1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
37	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
38	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)	4 (4)
NV*	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)

\*Not viable

### Vaccine-Preventable Cases and Deaths

For the countries reporting serotype data, more than 83% of *Streptococcus pneumoniae* cases in persons  $\geq 2$  years of age were preventable with use of the 23-valent polysaccharide vaccine. Use of the 7-valent conjugate vaccine would have potentially prevented 14-100% of *Strep pneumoniae* cases in children  $< 2$  years of age in 2003. The proportion of deaths potentially preventable with use

of the 23-valent polysaccharide vaccine related to *Streptococcus pneumoniae* ranged from 20% to 50%.

#### **Proportion of Vaccine Preventable Cases/Deaths from Invasive Pneumococcal Disease, ICS 2003 Data**

	Finland n/Denom* (%)	Greenland n/Denom* (%)	Iceland n/Denom* (%)	N. Canada n/Denom* (%)	U.S. Arctic n/Denom* (%)
<b>Cases ≥ 2 years old with serotype in the 23-valent pneumococcal polysaccharide vaccine</b>	629/652 (96)	8/9 (89)	14/18 (78)	20/23 (87)	62/75 (83)
<b>Cases &lt; 2 years old with serotype in the 7-valent pneumococcal conjugate vaccine</b>	31/59 (53)	1/1 (100)	3/3 (100)	0/5 (0)	2/14 (14)
<b>Deaths (all ages) for which the serotype was contained in the 23-valent pneumococcal vaccine</b>	†	1(50‡)	1 (20‡)	No deaths	5 (50‡)

\*Number of isolates serotyped by country by age group

†No outcome data reported by Finland

‡Percentage of total deaths

#### Outcome

A total of 96 deaths associated with *Streptococcus pneumoniae* were reported to ICS in 2003. Overall, the highest case fatality ratio (CFR) occurred in persons 65+ years of age (12%). Finland and N. Sweden did not report outcome data.

#### ***Streptococcus pneumoniae* Age-Specific Case-Fatality Ratios (CFR), ICS 2003 Data**

	<2 years	2-19 years	20-64 years	65+ years	All Ages
<b>Greenland</b>					
# Cases	2	2	8	0	12
Deaths (CFR)	1 (50)	0 (0)	1 (13)	0 (0)	2 (17)
<b>Iceland</b>					
# Cases	5	5	11	20	41
Deaths (CFR)	1 (20)	0 (0)	0 (0)	4 (20)	5 (12)
<b>N. Canada</b>					
# Cases	5*	6*	12*	6	29*
Deaths (CFR)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
<b>Norway</b>					
# Cases	63	63	403*	485*	1,014*
Deaths (CFR)	3 (5)	3 (5)	16 (4)	57 (12)	79 (8)
<b>U.S. Arctic</b>					
# Cases	15	10	57	16	98
Deaths (CFR)	0 (0)	0 (0)	7 (12)	3 (19)	10 (10)
<b>Total</b>					
# Cases	90*	86*	491*	527*	1,194*
Deaths (CFR)	5 (6)	3 (4)	24 (5)	64 (12)	96 (8)

\*Outcome unknown in (1) N. Canada case < 2 years, (1) N. Canada case 2-19 years, (2) N. Canada and (1) Norway cases 20-64 years, (1) Norway case 65+ years

#### Antimicrobial Susceptibility

In 2003, antimicrobial susceptibility results were reported to ICS from Finland, Greenland, Iceland, N. Canada, N. Sweden and the U.S. Arctic. Of those isolates tested from the U.S. Arctic, 3% were fully resistant to penicillin, 14% had intermediate resistance. The fully resistant isolates were serotypes 19F (67%) and 6B (33%). The isolates that showed intermediate resistance were serotypes 19A (86%), 6A (7%), and 15A (17%). Finland submitted results from 718 isolates; less than 1% were fully resistant to penicillin and 5% had intermediate resistance. The Finnish serotype data is



not linked to the antimicrobial susceptibility data, so no comparisons can be made. In Iceland, 7% of isolates tested had intermediate resistance to penicillin and consisted of one each serotype 9, 14 and 19. N. Sweden did not report serotype data; 1 isolate of 26 tested (4%) showed intermediate resistance to penicillin.

#### ***Streptococcus pneumoniae* Penicillin Susceptibility Results, ICS 2003 Data**

	# Tested	S*	I*	I* Serotypes	R*	R* Serotypes
<b>Finland</b>	718	679	33	†	6	†
<b>Greenland</b>	10	10	0		0	
<b>Iceland</b>	41	38	3	9 (1), 14 (1), 19 (1)	0	
<b>N. Canada</b>	28	28	0		0	
<b>N. Sweden</b>	26	25	1	‡	0	
<b>U.S. Arctic</b>	89	72	14	6A (1), 15A (1), 19A (12)	3	6B (1), 19F (2)

\*S=Sensitive, I=Intermediate resistance, R=Fully resistant

†Finnish serotype data is not linked to antimicrobial susceptibility data

‡N. Sweden did not report serotype data

Full resistance to trimethoprim-sulfamethoxazole (TMP-Sulfa) was found in 16% of tested isolates from the U.S. Arctic, 14% from N. Sweden, 13% from Iceland, and 4% from N. Canada. The isolates that were fully resistant in the U.S. Arctic were serotypes 19A (71%), 19F (14%), 6B (7%) and 15B (7%). In N. Canada, the fully resistant isolate was serotype 6B. Isolates from Iceland that were fully resistant to TMP-Sulfa were serotypes 19 (60%), 9 (20%), and 14 (20%). Intermediate resistance to TMP-Sulfa was found in 11% of tested isolates from the U.S. Arctic and 4% from N. Canada.

#### ***Streptococcus pneumoniae* TMP-Sulfa Susceptibility Results, ICS 2003 Data**

	# Tested	S*	I*	I* Serotypes	R*	R* Serotypes
<b>Iceland</b>	40	35	0		5	9 (1), 14 (1), 19 (3)
<b>N. Canada</b>	28	26	1	4	1	6B
<b>N. Sweden</b>	22	19	0		3	†
<b>U.S. Arctic</b>	89	65	10	12F (7), 19A (3)	14	6B (1), 15B (1), 19A (10), 19F (2)

\*S=Sensitive, I=Intermediate resistance, R=Fully resistant

†N. Sweden did not report serotype data

In Iceland, 17% of tested isolates were fully resistant to erythromycin, 11% in from N. Sweden, 6% from the U.S. Arctic, and 4% from N. Canada. The serotypes found in the fully resistant isolates from the U.S. Arctic were 6A (20%), 6B (20%), 15A (20%), and 19F (40%). In Iceland, the isolates that were fully resistant to erythromycin were serotypes 14 (86%) and 22 (14%).

#### ***Streptococcus pneumoniae* Erythromycin Susceptibility Results, ICS 2003 Data**

	# Tested	S*	I*	I* Serotypes	R*	R* Serotypes
<b>Iceland</b>	41	34	0		7	14 (6), 22 (1)
<b>N. Canada</b>	28	26	1	4	1	6B
<b>N. Sweden</b>	27	24	0		3	†
<b>U.S. Arctic</b>	88	83	0		5	6A (1), 6B (1), 15A (1), 19F (2)

\*S=Sensitive, I=Intermediate resistance, R=Fully resistant

†N. Sweden did not report serotype data

Antimicrobial testing was also done for ceftriaxone, ofloxacin/levoflox, chloramphenicol, vancomycin, clindamycin, and rifampin. In N. Sweden, one isolate out of four tested (25%) showed intermediate resistance to ceftriaxone; all isolates tested in Greenland, Iceland and the U.S. Arctic were sensitive to ceftriazone. Two of 89 (2%) isolates tested in the U.S. Arctic were fully resistant to chloramphenicol (serotypes 6B and 19F) and two of 79 tested were fully resistant to clindamycin (serotypes 6B and 19F). In N. Sweden, two of 14 (14%) isolates tested were fully resistant to clindamycin. All isolates tested in N. Canada, N. Sweden and the U.S. Arctic were sensitive to ofloxacin/levoflox, vancomycin, and rifampin.

### Quality Control

In 2003, three QC panels of seven *Streptococcus pneumoniae* isolates each were shipped and tested by all three reference laboratories. Serotyping correlation for all 21 isolates was 100. Overall correlation of the MIC results within +/- one log<sub>2</sub> dilution was 98.1%. MIC discrepancies between laboratories could be explained by differing ranges of antibiotic concentrations for each drug tested or incubation methods.

## *Haemophilus influenzae*

### Case Demographics

Greenland, N. Canada, N. Sweden and the U.S. Arctic reported the occurrence of *Haemophilus influenzae* in each country during 2003. Greenland reported no cases and therefore will not be included in the results. A total of 26 cases of invasive disease caused by *Haemophilus influenzae* were reported to ICS during 2003 by N. Canada, N. Sweden and the U.S. Arctic. The rate of disease was higher in N. Canada (5 per 100,000) than it was in the U.S. Arctic (3 per 100,000) or N. Sweden (<1 per 100,000). Median age of cases was higher in the U.S. Arctic (48 years) than in N. Canada (14 years).

### ***Haemophilus influenzae* Case Demographics, ICS 2003 Data**

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
N. Canada	127,913	6	4.7	4 (67)	14 (<1-58)	1 (33)‡
N. Sweden	252,874	1	0.4	1 (100)	1 case – 37	‡
U.S. Arctic	648,818	19	2.9	10 (53)	48 (<1-83)	5 (26)
<b>Total</b>	<b>1,029,605</b>	<b>26</b>	<b>2.5</b>	<b>15 (58)</b>	<b>42 (&lt;1-83)</b>	<b>6 (27)‡</b>

\*Number of cases per 100,000 per year

†Case fatality ratio

‡Case outcomes unknown in cases from N. Canada (3), N. Sweden did not report case outcomes

When stratified by age, the highest rates of disease for both N. Canada and the U.S. Arctic were in the <2 years age category; no disease was reported in this age category in N. Sweden. The U.S. Arctic also had high rates of disease in the 65+ years age category; no disease was reported in this age category in N. Canada or N. Sweden.

### ***Haemophilus influenzae* by Age Category, ICS 2003 Data**

Age		N. Canada	N. Sweden	U.S. Arctic
<2 yrs	Population	4,744	4,665	20,850
	Cases (%)	3 (50)	0 (0)	6 (32)
	Rate*	63	0	29
2-19 yrs	Population	43,888	54,372	196,573
	Cases (%)	0 (0)	0 (0)	1 (5)
	Rate*	0	0	0.5
20-64 yrs	Population	73,875	146,711	394,356
	Cases (%)	3 (50)	1 (100)	4 (21)
	Rate*	4	0.7	1
65+ yrs	Population	5,406	47,126	39,024
	Cases (%)	0 (0)	0 (0)	8 (42)
	Rate*	0	0	20.5
<b>All ages</b>	Population	127,913	252,874	648,818
	Cases	6	1	19
	Rate*	5	<1	3

\*Number of cases per 100,000 per year

### Race

Race and ethnicity data was unknown in half of the *Haemophilus influenzae* cases from N. Canada. Rates of disease were highest (106 per 100,000) in U.S. Arctic Native cases less than two years of age. In the U.S. Arctic, overall rates of disease were ten times higher in Native populations (10 per 100,000) than in non-Native populations (1 per 100,000); high rates of disease (43 per 100,000) also occurred in Native people 65+ years of age.

#### ***Haemophilus influenzae* by Race and Age Categories, ICS 2003 Data**

Age (yrs)	N Canada*		US Arctic	
	Aboriginal	Non-Aboriginal	Native	Non-Native
<2	Population	3,598	1,146	5,687
	Cases (rate†)	1 (28)	0 (0)	6 (106)
2-19	Population	31,848	12,040	47,642
	Cases (rate†)	0 (0)	0 (0)	1 (2)
20-64	Population	37,387	36,488	63,789
	Cases (rate†)	2 (5)	0 (0)	2 (<1)
65+	Population	3,037	2,369	7,004
	Cases (rate†)	0 (0)	0 (0)	3 (43)
All	Population	75,870	52,043	124,122
Ages	Cases (rate†)	3 (4)	0 (0)	12 (10)

\*Race unknown in 2 cases <2 years, 1 case 20-64 years

†Number of cases per 100,000 per year

#### **Clinical Presentation**

In N. Canada, the most common clinical presentation associated with *Haemophilus influenzae* was septicemia (50% of reported cases). The most common clinical presentation in the U.S. Arctic was pneumonia (42% of reported cases), followed by septicemia (26%). The one case reported in N. Sweden presented with bacteremia.

#### **Clinical Presentation of Reported *Haemophilus influenzae* Cases, ICS 2003 Data**

	N. Canada	N. Sweden	U.S. Arctic
	n (%)	n (%)	n (%)
<b>Pneumonia*</b>	0 (0)	0 (0)	8 (42)
<b>Septicemia</b>	3 (50)	0 (0)	5 (26)
<b>Bacteremia</b>	2 (33)	1 (100)	0 (0)
<b>Meningitis</b>	0 (0)	0 (0)	2 (11)
<b>Empyema</b>	0 (0)	0 (0)	1 (5)
<b>Septic arthritis</b>	0 (0)	0 (0)	2 (11)
<b>Other</b>	1 (17)	0 (0)	0 (0)
<b>Unknown</b>	0 (0)	0 (0)	1 (5)
<b>Total</b>	6	1	19

\*with bacteremia

## Risk Factors

Twenty-five percent of adult ( $\geq 18$  years) cases of *Haemophilus influenzae* reported in the U.S. Arctic indicated smoking, chronic lung disease or diabetes as an associated risk factor. One (33%) adult *Haemophilus influenzae* case in N. Canada reported smoking as a risk factor.

## Vaccination Status

The *Haemophilus influenzae* type b (Hib) conjugate vaccine is required as part of routine childhood vaccination in N. Canada and the U.S. Arctic. No cases of Hib were reported in N. Canada in children less than five years; one case was reported in the U.S. Arctic. The one Hib case in the U.S. Arctic had received 2 doses of Hib vaccine.

### ***Haemophilus influenzae* Case Vaccination Status for Hib Vaccine, ICS 2003 Data**

	N. Canada	U.S. Arctic
<b>Total cases eligible for Hib vaccine*</b>	3	7
<b>Vaccine status known in cases eligible for Hib vaccine</b>	1	7
<b>Cases eligible for Hib vaccine vaccinated (%)†</b>	1 (100)	7 (100)

\*Children less than 5 years of age

†Percent of vaccine status known cases

## Serotypes

### ***Haemophilus influenzae* Serotypes by Country, ICS 2003 Data**

Serotype	N. Canada n (%)	U.S. Arctic n (%)
<b>A</b>	3 (50)	6 (33)
<b>B</b>	1 (17)	2 (11)
<b>C</b>	0 (0)	1 (6)
<b>D</b>	0 (0)	1 (6)
<b>E</b>	1 (17)	0 (0)
<b>F</b>	0 (0)	1 (6)
<b>Non-typable</b>	1 (17)	7 (39)
<b>Total</b>	6	18*

\*Of 19 Hi cases in the U.S. Arctic, 18 were serotyped

The most common *Haemophilus influenzae* serotype in N. Canada and the U.S. Arctic was type A, 50% and 33% of reported cases, respectively. The age range of the serotype A cases in N. Canada was 0.4-1.4 years and, in the U.S. Arctic, it was 0.4-32 years.

## Outcome

Five deaths associated with *Haemophilus influenzae* were reported to ICS in 2003 from the U.S. Arctic and one death was reported from N. Canada. The overall case fatality ratio for the U.S. Arctic was 26% and in N. Canada it was 33%..

## *Neisseria meningitidis*

### Case Demographics

Greenland, N. Canada, N. Sweden and the U.S. Arctic each reported the occurrence of *Neisseria meningitidis* during 2003. A total of 9 cases of invasive disease caused by *Neisseria meningitidis* were reported to ICS. The rate of disease was highest in Greenland (5 per 100,000) and similar in N. Canada (<1 per 100,000), N. Sweden (<1 per 100,000) and the U.S. Arctic (<1 per 100,000). One death associated with *Neisseria meningitidis* was reported each in N. Canada and the U.S. Arctic.

### *Neisseria meningitidis* Case Demographics, ICS 2003 Data

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
Greenland	56,676	3	5.3	2 (67%)	10(1-41)	0 (0)‡
N. Canada	127,913	1	0.8	0 (0%)	one case – 15	1 (100)
N. Sweden	252,874	1	0.4	1 (100)	one case – <1	‡
U.S. Arctic	648,818	4	0.6	4 (100)	12 (2-19)	1 (25)
Total	958,368	9	0.9	7 (78)	8 (<1-41)	2 (29)

\*Number of cases per 100,000 per year

†Case fatality ratio

‡Outcome unknown in (1) Greenland case; no outcomes reported from N. Sweden

When stratified by age, the highest rates of disease occurred in cases less than two years of age in Greenland (56 per 100,000), N. Sweden (21 per 100,000), and the U.S. Arctic (5 per 100,000), however, this represents only one case in each country.

### Race

Race and ethnicity data were collected in N. Canada and the U.S. Arctic. Overall rates of disease in the U.S. Arctic were slightly higher in the Native population (0.8 per 100,000) than non-Native (0.6 per 100,000). The single case in N. Canada occurred in a non-Aboriginal person.

### Clinical Presentation

Two of three *Neisseria meningitidis* cases in Greenland, the one case each in N. Canada and N. Sweden and two of four cases in the U.S. Arctic clinically as meningitis; the remaining cases presented with bacteremia or septicemia.

### Risk Factors

Greenland, N. Canada and N. Sweden did not report any risk factors or other medical conditions associated with cases of *Neisseria meningitidis*. In the U.S. Arctic, smoking and chronic lung disease were each reported in association with one adult ( $\geq 18$  years) case.

## Group A *Streptococcus*

### Case Demographics

Greenland, N. Canada, N. Sweden and the U.S. Arctic each reported the occurrence of group A *Streptococcus* during 2003. Greenland reported no cases and therefore will not be included in the results. A total of 31 cases of invasive disease caused by group A *Streptococcus* were reported to ICS. The rate of disease was highest in N. Canada (6 per 100,000) compared to the U.S. Arctic (4 per 100,000) and N. Sweden (<1 per 100,000). Seven deaths were associated with group A *Streptococcus*, three in N. Canada and four in the U.S. Arctic.

### **Group A *Streptococcus* Case Demographics, ICS 2003 Data**

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
N. Canada	127,913	7	5.5	6 (86)	39 (3-76)	3 (50)‡
N. Sweden	252,874	1	0.4	0 (0)	1 case – 66	‡
U.S. Arctic	648,818	23	3.5	16 (70)	46 (<1-74)	4 (17)
<b>Total</b>	<b>1,029,605</b>	<b>31</b>	<b>3</b>	<b>22 (71)</b>	<b>46 (&lt;1-76)</b>	<b>7 (24)‡</b>

\*Number of cases per 100,000 per year

†Case fatality ratio

‡Outcome unknown in (1) case in N. Canada; outcomes not reported from N. Sweden

When stratified by age, the highest rates of disease occurred in individuals 65+ years of age in N. Canada (18 per 100,000) and in children <2 the U.S. Arctic (10 per 100,000).

### **Group A *Streptococcus* by Age Category, ICS 2003 Data**

Age		N. Canada	N. Sweden	U.S. Arctic
<2 yrs	Population	4,744	4,665	20,850
	Cases (%)	0 (0)	0 (0)	2 (9)
	Rate*	0	0	10
2-19 yrs	Population	43,888	54,372	196,573
	Cases (%)	2 (29)	0 (0)	3 (13)
	Rate*	5	0	2
20-64 yrs	Population	73,875	146,711	394,356
	Cases (%)	4 (57)	0 (0)	15 (65)
	Rate*	5	0	4
65+ yrs	Population	5,406	47,126	39,024
	Cases (%)	1 (14)	1 (100)	3 (13)
	Rate*	18	2	8
<b>All ages</b>	Population	127,913	252,874	648,818
	Total Cases	7	1	23
	Rate*	5	<1	4

\*Number of cases per 100,000 per year

## Race

Race and ethnicity data were collected by N. Canada and the U.S. Arctic. Rates of disease in the Aboriginal and Native populations were twice those in the non-Aboriginal and non-Native populations.

### **Group A *Streptococcus* by Race and Age Categories, ICS 2003 Data**

<b>Age (yrs)</b>	<b>N. Canada*</b>		<b>U.S. Arctic*</b>	
	<b>Aboriginal</b>	<b>Non-Aboriginal</b>	<b>Native</b>	<b>Non-Native</b>
<b>&lt;2</b>	Population	3,598	1,146	5,687
	Cases (rate†)	0 (0)	0 (0)	2 (35)
<b>2-19</b>	Population	31,848	12,040	47,642
	Cases (rate†)	0 (0)	1 (8)	2 (4)
<b>20-64</b>	Population	37,387	36,488	63,789
	Cases (rate†)	3 (8)	0 (0)	2 (3)
<b>65+</b>	Population	3,037	2,369	7,004
	Cases (rate†)	1 (33)	0 (0)	1 (14)
<b>All Ages</b>	Population	75,870	52,043	124,122
	Cases (rate†)	4 (5)	1 (2)	7 (6)

\*Race unknown in 1 N. Canada case 2-19 years, 1 N. Canada case 20-64 years

†Number of cases per 100,000 per year

## Clinical Presentation

In the U.S. Arctic, 43% of group A *Streptococcus* cases presented clinically with cellulitis, 22% presented with pneumonia or septicemia. Two of the cases (29%) in N. Canada presented with bacteremia and one each with septicemia, cellulitis, necrotizing fasciitis, and septic arthritis.

### **Clinical Presentation of Reported group A *Streptococcus* Cases, ICS 2003 Data**

	<b>N. Canada n (%)</b>	<b>U.S. Arctic n (%)</b>
<b>Pneumonia*</b>	0 (0)	5 (22)
<b>Bacteremia</b>	2 (29)	0 (0)
<b>Septicemia</b>	1 (14)	5 (22)
<b>Empyema</b>	0 (0)	1 (4)
<b>Cellulitis*</b>	1 (14)	10 (43)
<b>Necrotizing fasciitis</b>	1 (14)	0 (0)
<b>Septic arthritis</b>	1 (14)	1 (4)
<b>Other</b>	1 (14)	1 (4)
<b>Total</b>	7	23

\*with bacteremia

## Risk Factors

Cigarette smoking was associated with 57% and 35% of adult ( $\geq 18$  years) group A *Streptococcus* cases in N. Canada and the U.S. Arctic, respectively. Fourteen percent of N. Canada cases reported chronic lung disease and alcohol abuse as risk factors. In the U.S. Arctic, 26% of cases reported



chronic lung disease, 22% alcohol abuse, 17% diabetes, 9% immune suppressive therapy and 4% injection drug use.

### Outcome

Four deaths in cases with group A *Streptococcus* were reported from the U.S. Arctic (CFR 17%); two deaths occurred in each of the 20-64 year old and 65+ years age categories. Three deaths were reported in N. Canada (CFR 50%); two deaths occurred in the 20-64 year old age category and one death in the 65+ year category. Outcome was unknown in one group A *Streptococcus* case in N. Canada.

## Group B *Streptococcus*

### Case Demographics

Greenland, N. Canada, N. Sweden and the U.S. Arctic each reported the occurrence of group B *Streptococcus* during 2003. Greenland reported no cases and therefore will not be included in the results. A total of 29 cases of invasive disease caused by group B *Streptococcus* were reported to ICS. The rate of disease was highest in the U.S. Arctic and N. Canada (3 per 100,000) compared to N. Sweden (2 per 100,000). Two deaths were reported in the U.S. Arctic and one death in N. Canada associated with group B *Streptococcus* in 2003.

### Group B *Streptococcus* Case Demographics, ICS 2003 Data

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
N. Canada	127,913	4	3	2 (50)	45 (27-67)	1 (33)‡
N. Sweden	252,874	5	2	1 (20)	48 (0-74)	‡
U.S. Arctic	648,818	20	3	7 (35)	50 (0-90)	2 (11)‡
<b>Total</b>	<b>1,029,605</b>	<b>29</b>	<b>3</b>	<b>10 (34)</b>	<b>49 (0-90)</b>	<b>3 (11)</b>

\*Number of cases per 100,000 per year

†Case fatality ratio

‡Outcomes unknown in (1) N. Canada case, (1) U.S. Arctic case; no outcomes reported from N. Sweden

When stratified by age, the highest rates of disease occurred in cases less than two years of age in N. Sweden (43 per 100,000) and the U.S. Arctic (19 per 100,000).

### Group B *Streptococcus* by Age Category, ICS 2003 Data

Age		N. Canada	N. Sweden	U.S. Arctic
<2 yrs	Population	4,744	4,665	20,850
	Cases (%)	0 (0)	2 (40)	4 (20)
	Rate*	0	43	19
2-19 yrs	Population	43,888	54,372	196,573
	Cases (%)	0 (0)	0 (0)	2 (10)
	Rate*	0	0	1
20-64 yrs	Population	73,875	146,711	394,356
	Cases (%)	3 (75)	1 (20)	10 (50)
	Rate*	4	<1	3
65+ yrs	Population	5,406	47,126	39,024
	Cases (%)	1 (25)	2 (40)	4 (20)
	Rate*	18	4	10
<b>All ages</b>	Population	127,913	252,874	648,818
	Total Cases	4	5	20
	Rate*	3	2	3

\*Number of cases per 100,000 per year

The four cases that occurred in the U.S. Arctic and the two cases that occurred in N. Sweden in the less than 2 years age category were early onset (less than 7 days old) for rates of 39.9/100,000 and 86.2/100,000, respectively.

## Race

Race and ethnicity data was collected in N. Canada and the U.S. Arctic. Overall rates of disease caused by group B *Streptococcus* were higher in non-Aboriginal and non-Native populations. The highest rates of disease in N. Canada occurred in Aboriginals 65+ years of age and Alaska non-Native cases less than two years of age, 33 and 26 per 100,000 respectively.

### **Group B *Streptococcus* by Race and Age Categories, ICS 2003 Data**

<b>Age (yrs)</b>	<b>N. Canada</b>		<b>U.S. Arctic</b>	
	<b>Aboriginal</b>	<b>Non-Aboriginal</b>	<b>Native</b>	<b>Non-Native</b>
<b>&lt;2</b>	Population	3,598	1,146	5,687
	Cases (rate*)	0 (0)	0 (0)	4 (26)
<b>2-19</b>	Population	31,848	12,040	47,642
	Cases (rate*)	0 (0)	0 (0)	1 (2)
<b>20-64</b>	Population	37,387	36,488	63,789
	Cases (rate*)	1 (3)	2 (5)	1 (2)
<b>65+</b>	Population	3,037	2,369	7,004
	Cases (rate*)	1 (33)	0 (0)	3 (9)
<b>All Ages</b>	Population	75,870	52,043	124,122
	Cases (rate*)	2 (3)	2 (4)	3 (2)

\*Number of cases per 100,000 per year

## Clinical Presentation

In the U.S. Arctic, septicemia (40%) was the most common clinical presentation reported for cases of group B *Streptococcus* in 2003 followed by pneumonia (15%) and cellulitis (15%). Two cases in N. Canada presented with septicemia, one case with cellulitis and one with septic arthritis.

### **Clinical Presentation of Reported group B *Streptococcus* Cases, ICS 2003 Data**

	<b>N. Canada</b>	<b>U.S. Arctic</b>
	<b>n (%)</b>	<b>n (%)</b>
<b>Pneumonia*</b>	0 (0)	3 (15)
<b>Bacteremia</b>	0 (0)	2 (10)
<b>Septicemia</b>	2 (50)	8 (40)
<b>Meningitis</b>	0 (0)	1 (5)
<b>Peritonitis</b>	0 (0)	1 (5)
<b>Cellulitis*</b>	0 (0)	3 (15)
<b>Endocarditis</b>	1 (25)	0 (0)
<b>Septic arthritis</b>	1 (25)	2 (10)
<b>Total</b>	4	20

\*with bacteremia

## Risk Factors

Fifty percent of group B *Streptococcus* adult ( $\geq 18$  years) cases in N. Canada reported smoking as a risk factor in 2003. In the U.S. Arctic, diabetes was reported in 40% of adult cases, chronic lung disease in 25%, cigarette smoking in 15% and alcohol abuse in 10%.

## Outcome

Two deaths in cases with group B *Streptococcus* were reported in the U.S. Arctic (CFR 11%); one death occurred each in the <2 and in the 65+ age categories. One death (CFR 33%) in the 20-64 age category was reported in N. Canada.

## **CONCLUSIONS**

The ICS program continued to expand in 2003. The Northern Sweden county of Norbotten began to submit data on all ICS organisms to the program. Monitoring rates of disease and levels of antimicrobial resistance in these pathogens via use of the ICS system is important, and efforts to expand ICS to include all circumpolar nations will continue.

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## **SOURCE**

This report was prepared by:

Tammy Cottle  
Surveillance Coordinator

Michael Bruce, MD MPH  
Medical Epidemiologist

Alan Parkinson, PhD  
Supervisory Research Scientist

Arctic Investigations Program  
National Center for Infectious Diseases  
Centers for Disease Control and Prevention  
Phone: (907) 729-3400  
Fax: (907) 729-3429  
e-mail: [ics@cdc.gov](mailto:ics@cdc.gov)  
website: <http://www.cdc.gov/ncidod/aip/research/ics.html>

## REFERENCES

### International Circumpolar Surveillance (ICS) Participants, 2002

#### FINLAND

<b>Reference Laboratory</b>	National Public Health Institute (KTL) Laboratory, Oulu
<b>Laboratories</b>	<p>Et.-Pohjanmaan sh-piiri, Seinäjoen sairaalan mikrobiol. lab.  Etelä-Karjalan keskussairaalan kl.mikrobiologian laboratorio  HY – Serobakteriologian laitos  Jorvin sairaala, kliinisen mikrobiologian laboratorio  KYS – Mikrobiologian laboratorio  Kainuun keskussairaalan mikrobiologian laboratorio  Kanta-Hämeen keskussairaalan mikrobiologian laboratorio  Keski-Pohjanmaan keskussairaalan mikrobiologian laboratorio  Keski-Suomen keskussairaalan mikrobiologian laboratorio  Kymenlaakson keskussairaalan mikrobiologian laboratorio  Lapin keskussairaalan mikrobiologian laboratorio  Länsi-Pohjan keskussairaalan laboratorio  Mikkelin keskussairaalan mikrobiologian laboratorio  OYKS – Mikrobiologian laboratorio  Oulun kiakonissalairoksen laboratorio  Pohjois-Karjalan keskussairaalan mikrobiologian laboratorio  Päijät-Hämeen keskussairaalan mikrobiologian laboratorio  Rauman aluesairaalan laboratorio  Satakunnan keskussairaalan mikrobiologian laboratorio  Savonlinnan keskussairaalan laboratorio  TAYS – Mikrobiologian laboratorio  TYKS – Mikrobiologian laboratorio  Vaasan keskussairaalan mikrobiologian laboratorio</p>

#### GREENLAND

<b>Reference Laboratory</b>	<p>Statens Serum Institute, Copenhagen, Denmark  Centralab at Queen Ingrid's Hospital, Nuuk, Greenland</p>
<b>Laboratories</b>	<p>Nanortalik Hospital  Qaqortoq Hospital  Narsaq Hospital  Paamiut Hospital  Maniitsoq Hospital  Sisimut Hospital  Aasiaat Hospital  Qasigiannnguit Hospital  Ilulissat Hospital  Qeqertarsuaq Hospital  Uummannaq Hospital  Upernavik Hospital  Qaanaaq Hospital  Ammassalik Hospital  Ittoqqortoormiit Hospital</p>

## ICELAND

<b>Reference Laboratory</b>	Department of Microbiology, Landspítali University Hospital, Reykjavik
<b>Laboratories</b>	Akranes Hospital Isafjordur District Hospital Stykkisholmur Local Health Center St. Joseph's Hospital Hafnarfjorour Municipal Hospital of Vestmannaeyjar Akureyri Egilstadir Health Center Selfoss Health Center Sudurnes Health Center (Keflavik) Regional Hospital Neskaupstadur

## NORTHERN CANADA

<b>Laboratory Centre for Disease Control</b>	Respiratory Division, Bureau of Infectious Diseases, Laboratory Centre for Disease Control, Ottawa
<b>Reference Laboratories</b>	National Centre for Streptococcus, Provincial Laboratory of Public Health, Edmonton, AB Laboratoire de Santé Publique du Québec, Montréal, QC National Centre for Meningococcus, Provincial Laboratory of Public Health, Winnipeg, MB
<b>Laboratories</b>	Whitehorse General Hospital, Whitehorse, YK Stanton Regional Health Board, Yellowknife, NT H.H. Williams Memorial Hospital, Hay River, NT Inuvik Regional Hospital, Inuvik, NT Baffin Regional Hospital, Iqaluit, NU Churchill Regional Health Authority, Churchill, MB Cadham Provincial Laboratory, Winnipeg, MB Ungava Tulattavik Health Centre, Kuujjuaq, QC Inulitsavik Hospital, Puvirnituq, QC Cree Health Board, Chisasibi, QC CSSSR, Chibougamou, QC Val d'Or Hospital, Val d'Or, QC Melville Hospital, Goose Bay, NL Newfoundland Public Health Laboratory, St. John's, NL
<b>Public Health</b>	Yukon Communicable Disease Control, Whitehorse, YK Health Protection Unit, Government of NWT, Yellowknife, NT JA Hildes Northern Medical Unit, Winnipeg, MB Régie Régionale de la Santé et des Services Sociaux, Kuujjuaq, QC Région Cri de la Baie James, Module de Santé Publique, Montreal, QC Communicable Disease Control, Health Laborador Corporation, Goose Bay, NL IMPAct Coordinator, Vaccine Evaluation Centre, Vancouver, BC

### NORTHERN SWEDEN

<b>Reference Laboratory</b>	Department of Bacteriology, Swedish Institute for Infectious Disease Control, Stockholm
<b>Laboratories</b>	Department of Microbiology, Sunderby Hospital, Lulea

### NORWAY

<b>Reference Laboratory</b>	Oslo/Tromsø
<b>Laboratories</b>	<p> Frederikstad, Østf. SSH  Sarpsborg SH  Akershus SSH, SiA  Bærum SH  Aker SH  Fürsts laborat, Oslo  Dr. Willes med.lab.  Radiumhospitalet  Folkehelsa, vir.lab.  Folkehelsa, bakt.lab.  Forsv.mik.lab.Folk.h.  Rikshospitalet, mik.lab.  Ullevål SH, mik.lab.  Lab. klin. mikrob. Oslo  Lillehammer mik.lab  Elverum mik.lab.  Buskerud SSH, mik.lab.  Vestfold SSH, mik.lab.  Telelab  Vest-Agder SSH, mik.lab.  Rogaland SSH, mik.lab.  Haukeland SH, mik.lab.  Sogn-Fk. SSH, mik.lab.  Ålesund FSH, mik.lab.  Molde FSH, mik.lab.  Trondheim RSH, mik.lab.  Innherred SH, mik.lab.  Namdalen SH, mik.lab.  Nordland SSH, mik.lab.  Tromsø RSH, mik.lab.  Kirkenes SH, mik.lab.  Laboratorium INA/div.  Haugesund, mik.lab. </p>



## U.S. ARCTIC

<b>Reference Laboratory</b>	Arctic Investigations Program, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Anchorage, AK
<b>Laboratories</b>	<p>Alaska Native Medical Center, Anchorage, AK</p> <p>Alaska Regional Hospital, Anchorage, AK</p> <p>Bartlett Regional Hospital, Juneau, AK</p> <p>Bassett Army Hospital, Fort Wainwright, AK</p> <p>Central Peninsula General Hospital, Soldotna, AK</p> <p>Cordova Community Medical Center, Cordova, AK</p> <p>Elmendorf Air Force Base Hospital, Anchorage, AK</p> <p>Fairbanks Memorial Hospital, Fairbanks, AK</p> <p>Kanakanak Hospital, Dillingham, AK</p> <p>Ketchikan Regional Hospital, Ketchikan, AK</p> <p>Manilaq Medical Center, Kotzebue, AK</p> <p>Norton Sound Regional Hospital, Nome, AK</p> <p>Petersburg Medical Center, Petersburg, AK</p> <p>Providence Alaska Medical Center, Anchorage, AK</p> <p>Providence Island Medical Center, Kodiak, AK</p> <p>Samuel Simmonds Memorial Hospital, Barrow, AK</p> <p>Sitka Community Hospital, Sitka, AK</p> <p>South Peninsula Hospital, Homer, AK</p> <p>Southeast Area Regional Health Corporation, Sitka, AK</p> <p>State Public Health Laboratory, Division of Public Health, Department of Health and Social Services, Anchorage, AK</p> <p>Valdez Community Hospital, Valdez, AK</p> <p>Valley Hospital, Palmer, AK</p> <p>Wrangell General Hospital, Wrangell, AK</p> <p>Yukon-Kuskokwim Delta Regional Hospital, Bethel, AK</p>